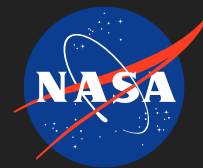


## In-Situ Solid Phase Extraction of Chemical Targets (INSPECT), Phase I



Completed Technology Project (2018 - 2019)

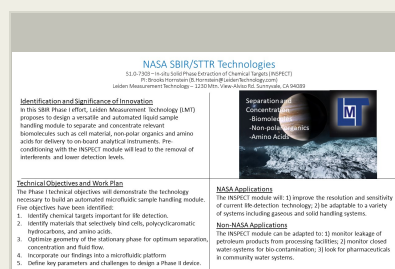
## Project Introduction

In this Small Business Innovative Research (SBIR) Phase I effort, Leiden Measurement Technology (LMT) proposes to design the IN-situ Solid Phase Extraction of Chemical Targets (INSPECT) instrument, a versatile and automated sample processing module that can couple to several analytical instruments via a microfluidic platform. The proposed device INSPECT can separate a range of biologically relevant molecules such as cells, large proteins, polycyclic aromatic hydrocarbons and amino acids important for life detection. This technology will reduce interferences and concentrate samples thus lowering detection limits by providing more refined (or pre-separated) samples to on-board analytical instruments. Separation and concentration is achieved with micro-chromatography columns that borrow technology from solid phase extraction (SPE), solid phase micro-extraction (SPME), cell adhesion technology and traditional chromatography. The INSPECT system not only increases the resolution and sensitivity for life-detection but also uses low power, volume and mass, all of which are principal factors noted in subtopic S1.07 In Situ Instruments/Technologies for Planetary Science. This method is an improvement over other extraction systems that require volatile organic solvents or high volumes of solvent for sample processing. Moreover, it is our goal to make this module INSPECT will be compatible with analytical techniques currently being developed at NASA including electrophoresis, gas chromatography, HPLC, UV fluorescence spectroscopy, Raman spectroscopy and mass spectroscopy.

## Anticipated Benefits

The INPECT technology provides innovative sample processing for the purpose of improving the resolution and sensitivity of life-detection measurements. Specifically, we have targeted environmental samples from Ocean World bodies with water and ice (i.e., Europa, Enceladus and Titan), but this module may be adapted for other environments where there is a need to detect trace amounts of organics and biomolecules as NASA continues to search for extant and extinct life throughout the solar system.

The INSPECT technology, once completed, can be adapted for selective monitoring of terrestrial chemical levels. This will be important for environmental monitoring of groundwater near crude oil deposits and pipelines, or used to monitor the spread of pollutants associated with hydraulic fracturing. The INSPECT device could also be adapted to monitor pharmaceuticals in waste or drinking water which are becoming more abundant in densely populated areas.



## In-Situ Solid Phase Extraction of Chemical Targets (INSPECT), Phase I

## Table of Contents

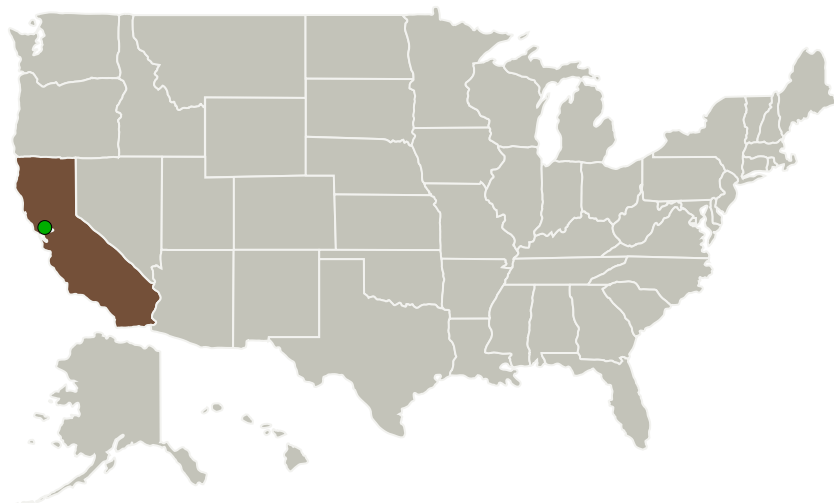
Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Images	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

## In-Situ Solid Phase Extraction of Chemical Targets (INSPECT), Phase I

Completed Technology Project (2018 - 2019)



## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Leiden Measurement Technology, LLC	Lead Organization	Industry	Sunnyvale, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California

## Project Transitions

▶ **July 2018:** Project Start

✓ **February 2019:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141118>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Leiden Measurement Technology, LLC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

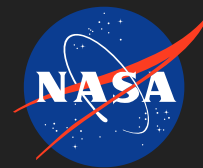
## Principal Investigator:

Brooks Hornstein

## Co-Investigator:

Brooks J Hornstein

## In-Situ Solid Phase Extraction of Chemical Targets (INSPECT), Phase I



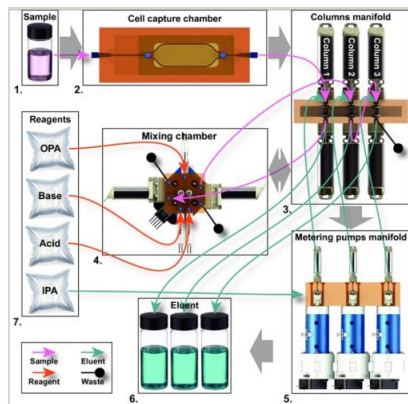
Completed Technology Project (2018 - 2019)

## Images



## Briefing Chart Image

In-Situ Solid Phase Extraction of Chemical Targets (INSPECT), Phase I  
(<https://techport.nasa.gov/image/128827>)

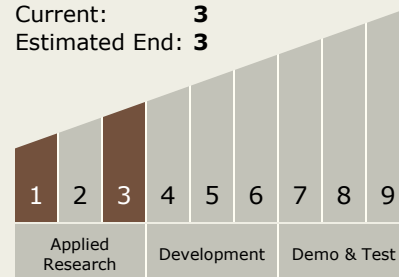


## Final Summary Chart Image

In-Situ Solid Phase Extraction of Chemical Targets (INSPECT), Phase I  
(<https://techport.nasa.gov/image/136779>)

## Technology Maturity (TRL)

Start: **1**  
Current: **3**  
Estimated End: **3**



## Technology Areas

## Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

## Target Destinations

Earth, Mars, Others Inside the Solar System